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ABSTRACT

The identification of students' learning styles and the subsequent correlation of them with teaching styles have important implications for curricula and instruction. The cognitive, affective, and physiological aspects of learning style are based on genetic structure and personality and are affected by the individual's developmental and environmental characteristics. In order to match learning and teaching styles, teachers should be skilled in several styles in order to accommodate individual differences. Students should be provided with a variety of learning settings, resources, and instructional methodologies that will ultimately match their self-determined needs and goals. Students taught by their preferred method tend to achieve better, be more interested in the subject matter, like the way the subject is taught, and want to learn other subjects the same way. The matching of teaching/learning styles is accomplished either by adapting the environment to the existing skills of the learner or helping the individual to adapt successfully to the demands of the environment. Differences in learning styles cannot be accommodated on all occasions, but educators should make every effort to understand these differences and alter instructional style in those areas and at those times that modifications are possible. Efforts should also be made to adjust for affective and physiological dimensions of learning styles. Lists of instruments for assessing learning styles and types of learning and teaching styles are appended. (AJL)

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LEARNING STYLES: IMPLICATIONS FOR CURRICULUM AND INSTRUCTION

Paper presented at the
Alberta Association for Adult Literacy Conference,
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Harley J. Ast

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For many years, educators have recognized the need for alternative instructional approaches to meet the needs of the wide variety of students in heterogeneously grouped classrooms. They are keenly aware that each student possesses unique needs, interests, and abilities, and that no single instructional approach provides optimal learning for all students. In spite of this, classroom teachers continue to share the frustration of knowing that the varying needs and characteristics of many learners are not being met. One of the main reasons that students' individual needs are not being met is the failure to accommodate the unique learning styles of those students. The purpose of this paper is to show that the identification of students' learning styles and the subsequent matching of those learning styles with teaching styles have important implications for the field and practice of curriculum and instruction. To that end, this paper will look at what a learning style is, how it can be identified, and why the matching of learning styles and teaching styles enhances educational outcomes. Some curriculum implications along with results of current research are at the end of the paper.

The learning styles approach employs three steps: (1) examine the student's individual learning style; (2) understand it and classify it according to several large categories; and (3) match it with the teaching style of an available teacher, or request that a teacher adjust his/her teaching style to match the student's learning style. The requirements for implementing this three-step model are: (1) a clear concept of learning style; (2) a practical instrument that will easily and accurately indicate a student's learning style (see Appendix A); and, (3) a match-up of learning style to teaching style.

Many attempts have been made to define learning style.

> Learning style consists of distinctive behaviors which serve as indicators of how a person learns from and adapts to his environment. It also gives clues as to how a person's mind operates (Gregorc 1979, 234).

> The manner in which many different elements from five basic stimuli affect a person's ability to absorb and retain. [Dunn] listed the five basic stimuli as environmental, emotional, psychological, sociological, and physical (qtd. in Semple 1982, 6-7).

> Perhaps the most thoroughly investigated of learning styles are those involving perception, the process most intimately associated with learning. Educators usually refer to the channels through which perception occurs as modalities: vision, audition, and kinesthesia (Barbe and Milone 1981, 378).

Even though the above definitions differ somewhat, their many stands reveal essential similarities and are mutually supportive. Therefore, each author is really describing some or all aspects of what has come to be known as learning style. It appears that there are actually three aspects to an individual's learning style (Cornett 1983, 9-11).

1. Cognitive Aspect: ...the ways we decode, encode, process, store, and retrieve information.

2. Affective Aspects: ...emotional and personality characteristics related to such areas as motivation, attention, locus of control, interests, willingness to take risks, persistence, responsibility and sociability.

3. Physiological Aspects: ...sensory perception (visual, auditory, kinesthetic, taste, and smell), environmental characteristics (noise level, light, temperature, room arrangement), need for food during study, and times of day for optimum learning.

In terms of a comprehensive definition:

> Learning styles are characteristic cognitive, affective, and physiological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Keefe 1987, 16).

It is within these three aspects, therefore, that the learner develops unique and characteristic patterns of behavior and performance

through which he/she perceives, processes, and responds to various educational experiences. Consequently, through an evolutionary process, the learner produces a separate substyle for each aspect through which he/she relates to, processes, and responds to stimuli from his/her environment. An individual's overall learning style, therefore, can be considered as the sum of his/her three substyles in each of the cognitive, affective, and physiological aspects. And, since the combination of behaviors within each substyle is undoubtedly unique, it follows that an individual's learning style will be unique as well (see Appendix B). That being the case, each person has his/her characteristic way in which he/she interacts with the environment to produce that auspicious behavior called learning.

Teaching style can have a tremendous impact on the student's learning style (see Appendix C). It is reasonable to assume that the learning of all students would be enhanced if they were taught in a manner conducive to their individual learning style(s).

> Teaching style consists of a teacher's personal behaviors and the media used to transmit or receive data from the learner. Teacher behavior and media used place demands upon both the teacher and the learner to align their styles (Practical Applications of Research 1980, 1).

> Different procedures and methods will need to be used with different students for the attainment of educational goals, but regardless of his abilities and learning styles these efforts to personalize instruction should never deny a student the whole range of opportunities for the fullest measure of development of his unique potentialities (Saylor and Alexander 1974, 281).

Merely identifying a teaching style is of little value, however, unless an attempt is made to match it with an appropriate learning style. Suggestions for matching teaching and learning styles have

been made:

> New pedagogical procedures should acknowledge the interactions between the dispositions of the learner and the material, and tailor presentations to the preferred strategy of the child (Kagan 1965, 323).

Keefe concurred when he suggested that teachers should identify and attempt to match an appropriate teaching style with the three aspects/domains of a student's learning style (Henson and Borthwick 1984, 4). The cognitive, affective, and physiological aspects of learning style are based in genetic structure and personality and,hence, are affected bv the individual's developmental and environmental characteristics (qtd. in Keefe 1987, 5). Further, the cognitive elements are internal to the learner's information processing structure and require careful training for any lasting modifications; the affective elements are preferential in nature, and they respond to both training and matching; the physiological elements are rooted in learner reactions to the environment and, thus, are the most responsive to matching strategies (Keefe 1987, 36).

In order to match learning and teaching styles, teachers must have available to them or develop a variety of teaching styles rather than be adept in just one particular style: preferably, they should be skilled in several styles in order to match individual differences in learning styles. The key is to approach teaching style concepts in terms of the way teachers organize classroom and learning experiences, i.e., students should be provided with a wide variety in learning settings, resources, and instructional methodologies that will ultimately match their learning styles. This process would involve having students examine their own needs and goals, and then

providing teaching styles based on the students' stated preferences (Dunn 1984, 11-13; Smith and Renzulli 1982, 6).

There is no doubt that by giving students the opportunity to evaluate their learning style preferences and by "delivering" instruction that is consistent with their assessments, educational outcomes will be enhanced. Students who are taught by their preferred method tend to achieve better, are more interested in the subject matter, like the way the subject is taught, and want to learn other subjects the same way (Smith and Renzulli 1984, 48). In other words, giving students the opportunity to choose their own topics may increase their "investment" in the learning material being prescribed, i.e., students become more involved in learning what has to be learned if they are offered choices in how information or skills can be acquired.

Of major significance for classroom practice, then, is the fact that matching teaching styles to learning style preferences helps to address the responses various teaching modalities elicit from students. Here, the key element seems to be either adapting the environment to the existing skills of the learner or helping the individual adapt successfully to the demands of the environment. From an instructional point of view, the decision either to change the learning environment or to train the learner is a practical one involving a consideration of the available resources, as well as the student's age, developmental capacity, and skill level. Clearly, some learners need more responsive instructional environments, while other learners need better cognitive skills to cope with the existing environment. In addition, modifying the learning environment may be applicable only to affective and physiological style preferences.

Thus, if a student fails to respond to matched conditions of learning and teaching, then his/her cognitive styles must be retrained for him/her to be successful. In this case, remediation may be the appropriate strategy for cognitive style improvement, and individualization of the learning environment may be the best strategy for affective and physiological style matches. On the other hand, some learners may even require both cognitive training and more individualized programs of instruction to be successful in school.

Obviously, differences in learning style preferences cannot be accommodated on all occasions. Nevertheless, educators should make every effort to (1) understand these differences, and (2) alter instructional style in those areas and at those times that modifications are possible (Smith and Renzulli 1984, 47). Cognitive style elements, for example, refer to how perceptual modality preferences describe each learner's tendency to use different sensory modes to understand and experience, i.e., people perceive reality in three basic ways: through the visual/spatial, the aural/verbal, and the psychomotor/kinesthetic. And, "perceptual preference seems to evolve from kinesthetic to visual and eventually to verbal as the learner matures" (Keefe 1987, 38). Current research concurs:

> ...low reading achievement individuals preferred to learn using tactile and kinesthetic senses (qtd. in Semple 1982, 21);
>
> ...girls...can learn to read through a phonics approach, and...boys...require tactile-kinesthetic resources...to learn how to read easily (qtd. in Semple 1982, 24);
>
> ...females preferred learning through the auditory sense... (qtd. in Semple 1982, 25);
>
> males preferred learning through visual sense in grades 6 and 11 and preferred learning using the tactile and kinesthetic senses in grades 5, 6 and 8 (qtd. in Semple 1982, 25).

Therefore, in the classroom, a teacher who is alert to these preferences can arrange for flexibility in grouping, in the selection of materials, and in his/her teaching style.

The second dimension of learning style, affective style elements, include personality traits that have to do with the processes of motivation -- attention, emotion, and valuing. Affective learning styles can be viewed as the student's typical mode of arousing, directing, and sustaining behavior. For the most part, students "develop through unsocialized, dependent, and independent styles, requiring successively less structure and showing increasing self-expression and autonomy (Keefe 1987, 20). Furthermore, affective learning styles are a by-product of learner personality, cultural environment, parental and peer pressures, and school influences. Research in this area indicates:

> ...the high achieving student is more independent and motivated than other students. High achievers perceived themselves as more responsible for their academic work, needing less structure..., and preferring not to be involved in adult oriented learning activities... (Smith and Holliday 1986, 7);
>
> ...gifted students tend to prefer instructional methods that emphasized independence while students in the general population prefer instructional methods with somewhat more structure (Smith and Renzulli 1982, 11):
>
> ...high achievers may be more prone to receive reinforcement from their teachers and find academic work intrinsically rewarding (Smith and Holliday 1986, 8);
>
> the low achievers perceived themselves as less responsible, needing more structure, being more adult-oriented, having a preference for learning through several approaches and desiring more visual material... (Smith and Holliday 1986, 6).
>
> ...the C-average student is more extrinsically motivated: requiring the support and enthusiasm of others

> around him/her to generate the emotional desire to learn. The brighter (A-average) students are more intrinsically motivated; not needing much peer energy to tap the emotional motivation to learn (Ristow and Edeburn 1983, 23).

Classroom teachers who are aware of these learning style preferences should realize that these students are motivated by the school itself, by their teachers, and by the subjects they study and, hence, they should capitalize on these preferences by altering the environment accordingly, enhancing social interaction, and by presenting the content material in interesting ways and through a variety of media.

The third domain of learning styles includes the learning-related behaviors of the human body: "physiological styles are biologically based modes of response that are founded on sex-related differences, personal nutrition and health, and reaction to the physical environment" (Keefe 1987, 21). The environmental elements that influence learning are light, sound, and temperature, and the related physiological learning styles are the student's varying reactions to these elements. The way a student feels, whether he/she has had a nourishing breakfast, the time of day, the layout and atmosphere of the classroom -- all of these affect student performance as well.

> Such needs include food intake, the ability to move about the classroom and time of day that instruction takes place. Low achievers perceived themselves as having more physical needs than high and average achievers (Smith and Holliday 1986, 9).

> The management of an elementary classroom may not incorporate enough physical stimuli, i.e., music, food intake, peer and group activities to meet the low achievers optimally perceived learning environment (Smith and Holliday 1986, 9).

> ...girls progress along the perceptual continuum faster than boys... (Semple 1982, 23).
>
> ...females prefer to engage in more independent, individual activities while males are more dependent upon authority figures for their information (Ristow and Edeburn 1983, 23).

Teachers who are sensitive to these physiological influences can provide a learning environment with useful options, and they can learn to adapt classroom activities to individual differences.

Based on the results of research into learning styles, it appears that there is tremendous potential for improvement of instruction at all levels. At a time when there is an ever-increasing demand for individualized learning and a constant quest for more effective teaching strategies, learning styles could provide many of the answers to questions about effectiveness and accountability held by professional educators and administrators.

If one were to relate to others the most important aspects of learning styles research, the following points would have to be included:

1. teaching and learning styles can be identified;
2. teachers need to guard against over-teaching to their own preferred learning style;
3. teachers are most helpful when they assist students to identify and learn through their own preferred style;
4. students should have an opportunity to learn through their preferred style;
5. students should be encouraged to diversify their style preferences -- "style flex";
6. teachers can develop learning activities which reinforce each modality or style (qtd. in Smith 1988, 15).

Although learning style inventories can provide valuable information

about learners, their results, i.e., their styles, should not be interpreted as being the only ways to approach all possible learning situations and to deal with all content areas. Every approach has its advantages and disadvantages and will be differentially effective depending on many factors. However, given the ever-increasing volume of literature supporting the utilization of learning styles research, educators have a mandate to seize upon this knowledge, and as much as possible, to modify current teaching styles to accommodate the individual learning styles of students in their classrooms.

APPENDIX A

Learning Style Assessment Instruments

Multidimensional Instruments

Child Rating Form by Manuel Ramirez and Alfred Castaneda. In Cultural Democracy, Biocognitive Development, and Education. New York: Academic Press, 1974.

Cognitive Style Interest Inventory by Joseph Hill. In Personalized Education Programs Utilizing Cognitive Style Mapping. Bloomfield Hills, Mich.: Oakland Community College, 1971.

Learning Style Identification Scale by Paul Malcom, William Lutz, Mary Gerken, and Gary Hoeltke. Publishers Test Service (CTB/McGraw-Hill), 2500 Garden Road, Monterey, Calif. 93940, 1981.

Learning Styles Inventory by Joseph Renzulli and Linda Smith. Mansfield Center, Conn.: Creative Learning Press, 1978.

Learning Style Inventory (students, 1978) and Productivity Environmental Survey (adults, 1977) by Rita Dunn, Kenneth Dunn, and Gary E. Price. Price Systems, Box 3271, Lawrence Kans. 66044.

Learning Style Inventory: Primary Version by Janet Perrin, Jamaica, New York: St. John's University, 1981.

Learning Styles Inventory by Albert A. Canfield and Judith S. Canfield. Humanics Media, (Liberty Drawer) 7970, Ann Arbor, Mich. 48107, 1976.

Myers-Briggs Type Indicator by Isabel Briggs Myers and Katherine C. Briggs. Consulting Psychologists Press, Inc., 577 College Avenue, Palo Alto, Calif. 94306, 1976.

Short Inventory of Approaches to Studying by Noel Entwistle. In Styles of Learning and Teaching. New York: John Wiley and Sons, 1981.

Student Learning Styles Questionnaire by Anthony F. Grasha and Sheryl W. Riechmann. Institute for Research and Training in Higher Education, University of Cincinnati, Cincinnati, Ohio 45221, 1974.

Cognitive Style Instruments

Cognitive Profiles by Charles A. Letteri. In Cognitive Profile: Basic Determinant of Academic Achievement. Burlington, Vt.: Center for Cognitive Studies, 1980.

Concrete-Operational Reasoning Test and Logical Reasoning Test. In Robert Sund. Piaget for Educators. Columbus, Ohio: Charles E. Merrill, 1976.

Group Embedded Figures Test (also Embedded Figures Test and Children's Embedded Figures Test) by Herman A. Witkin et al. Consulting Psychologists Press Inc., 577 College Ave., Palo Alto, Calif. 94306, 1971.

Inventory of Learning Processes by Ronald R. Schmeck, Fred Ribich, and Nerella Ramanaiah. In "Development of a Self-Report Inventory for Assessing Individual Differences in Learning Processes," Applied Psychological Measurement 1(1977): 413-31.

Learning Strategies Questionnaire by Norman Kagan and David R. Krathwohl. In Studies in Human Interaction, Washington, D.C.: HEW/USOE Bureau of Research, 1967.

Learning Style Inventory by David Kolb. In "Disciplinary Inquiry Norms and Student Learning Styles: Diverse Pathways for Growth." In The Modern American College, edited by Arthur Chickering. San Francisco: Jossey-Bass, 1981.

Matching Familiar Figures Test by Jerome Kagan. In "Impulsive and Reflective Children." In J. Krumboltz. Learning and the Educational Process. Chicago: Rand McNally, 1965.

Schematizing Test by R.W. Gardner et al. In "Cognitive Control: A Study of Individual Consistencies in Cognitive Behavior." Psychological Issues 1(4) (1959).

Transaction Ability Inventory by Anthony F. Fregorc. Department of Secondary Education, University of Connecticut, Box U-33, Storrs, Conn. 06268.

Your Style of Learning and Thinking Forms A & B by E. Paul Torrance, Cecil R. Reynolds, T.R. Riegel, and O.E. Ball. Gifted Child Quarterly 2(1977): 563-573.

Affective Style Instruments

Intellectual Achievement Responsibility Questionnaire by V.C. Crandall, W. Katkovsky and V.J. Crandall. In "Children's Belief in Their Own Control of Reinforcements in Intellectual-Academic Achievement Situations," Child Development 36 (1965):91-109.

Student Motivation Information Form by Raymond J. Wlodkowski. University of Wisconsin, Milwaukee, 1978. (Available from NEA.)

Paragraph Completion Method by David E. Hunt et al. In Assessing Conceptual Level by the Paragraph Completion Method. Ontario Institute for Studies in Education, 252 Bloor Street West, Toronto, Ont. M5S 1V6, 1978.

People in Society (Internal/External) Scale by Julian B. Rotter. In "Generalized Expectations for Internal Versus External Control of Reinforcements." Psychological Issues 1(4) (1959): 11-12.

Perceptual Modality Instruments

Swassing-Barbe Modality Index by Walter Barbe and Raymond Swassing. Columbus, Ohio: Zaner-Bloser, 1979.

Swassing-Barbe Checklist of Observable Modality Strength Characteristics. Columbus, Ohio: Zaner-Bloser.

"Find Your Modality Strengths" by Walter Barbe. In Instructor (January 1980).

Learning Methods Test by Robert Mills. Available from The Mills School, 1512 E. Broward Blvd., Ft. Lauderdale, Fla. 1955.

Edmonds Learning Style Identification Exercise by Harry Reinert. In "One Picture is Worth a Thousand Words" Not Necessarily! The Language Journal 60 (1976): 160-68.

SRI Student Perceiver Interview Guide. Selection Research, Incorporated, 2546 South 48th Plaza, P.O. Box 6438, Lincoln, Neb. 68506, 1978.

(Cornett 1983, 32-37)

APPENDIX B

Specific and identifiable learning styles characterized by students

1. Incremental learner -- needs a highly structured approach designed to permit the student to reach a generalization.
2. Intuitive learner -- unsystematic, sporadic learner who often is unable to explain what has been learned in any organized manner.
3. Sensory specialist -- relies upon one sense (e.g., visual or auditory) even though all are sufficiently operating.
4. Sensory generalist -- depends upon all senses.
5. Emotionally involved -- requires an environment both physically and mentally stimulating to "cause a high emotional charge."
6. Emotionally neutral -- requires a "low-key" atmosphere.
7. Explicitly structured -- needs clear objectives and organized lesson.
8. Open-ended structure -- prefers an open-ended rather than highly structured environment.
9. Damaged learner -- a physically normal student with a damaged self-concept and social skills, and who has a negative attitude toward learning.
10. Eclectic learner -- can alter learning styles to fit the occasion despite having a preference for one or another.

(qtd. in Henson and Borthwick 1984, 5)

APPENDIX C

Examples of different teaching styles

Task-oriented -- Specifically planned tasks associated with some appropriate materials, are prescribed.

Cooperative planner -- An instructional venture is planned by teacher and students but the teacher is in charge.

Child centered -- A task structure is provided by the teacher with the students given options according to their interests.

Subject centered -- Content is planned and structured to the extent that students are nearly excluded.

Learning centered -- Equal concern is shown by the teacher for both the student and subject content. Child and subject centered styles are not acceptable since this teacher attempts to guide students in their development.

Emotionally exciting -- An emotional zeal is exhibited by these teachers in their attempts to make their teaching as stimulating as possible.

(qtd. in Henson and Borthwick 1984, 6)

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